OPERATORS MANUAL AND PARTS CATALOG

FOR

GENERATOR 60UL-299/18A AND CONTROL

CONTRACT DA-23-195-AMC-00914 (T)

ONAN ENGINE/GENERATOR DIVISION Studebaker CORPORATION

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Important Safety Precautions

Read and observe these safety precautions when using or working on electric generators, engines and related equipment. Also read and follow the literature provided with the equipment.

Proper operation and maintenance are critical to performance and safety. Electricity, fuel, exhaust, moving parts and batteries present hazards that can cause severe personal injury or death.

FUEL, ENGINE OIL, AND FUMES ARE FLAMMABLE AND TOXIC

Fire, explosion, and personal injury can result from improper practices.

- Used engine oil, and benzene and lead, found in some gasoline, have been identified by government agencies as causing cancer or reproductive toxicity. When checking, draining or adding fuel or oil, do not ingest, breathe the fumes, or contact gasoline or used oil.
- Do not fill tanks with engine running. Do not smoke around the area. Wipe up oil or fuel spills. Do not leave rags in engine compartment or on equipment. Keep this and surrounding area clean.
- Inspect fuel system before each operation and periodically while running.
- Equip fuel supply with a positive fuel shutoff.
- Do not store or transport equipment with fuel in tank.
- Keep an ABC–rated fire extinguisher available near equipment and adjacent areas for use on all types of fires except alcohol.
- Unless provided with equipment or noted otherwise in installation manual, fuel lines must be copper or steel, secured, free of leaks and separated or shielded from electrical wiring.
- Use approved, non-conductive flexible fuel hose for fuel connections. Do not use copper tubing as a flexible connection. It will work–harden and break.

EXHAUST GAS IS DEADLY

- Engine exhaust contains carbon monoxide (CO), an odorless, invisible, poisonous gas. Learn the symptoms of CO poisoning.
- Never sleep in a vessel, vehicle, or room with a genset or engine running unless the area is equipped with an operating CO detector with an audible alarm.
- Each time the engine or genset is started, or at least every day, thoroughly inspect the exhaust system. Shut down the unit and repair leaks immediately.
- Warning: Engine exhaust is known to the State of California to cause cancer, birth defects and other reproductive harm.

Make sure exhaust is properly ventilated.

- Vessel bilge must have an operating power exhaust.
- Vehicle exhaust system must extend beyond vehicle perimeter and not near windows, doors or vents.
- Do not use engine or genset cooling air to heat an area.
- Do not operate engine/genset in enclosed area without ample fresh air ventilation.
- Expel exhaust away from enclosed, sheltered, or occupied areas.
- Make sure exhaust system components are securely fastened and not warped.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not remove any guards or covers with the equipment running.
- Keep hands, clothing, hair, and jewelry away from moving parts.
- Before performing any maintenance, disconnect battery (negative [–] cable first) to prevent accidental starting.
- Make sure fasteners and joints are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- If adjustments must be made while equipment is running, use extreme caution around hot manifolds and moving parts, etc. Wear safety glasses and protective clothing.

BATTERY GAS IS EXPLOSIVE

- Wear safety glasses and do not smoke while servicing batteries.
- Always disconnect battery negative (–) lead first and reconnect it last. Make sure you connect battery correctly. A direct short across battery terminals can cause an explosion. Do not smoke while servicing batteries. Hydrogen gas given off during charging is explosive.
- Do not disconnect or connect battery cables if fuel vapors are present. Ventilate the area thoroughly.

DO NOT OPERATE IN FLAMMABLE AND EXPLOSIVE ENVIRONMENTS

Flammable vapor can be ignited by equipment operation or cause a diesel engine to overspeed and become difficult to stop, resulting in possible fire, explosion, severe personal injury and death. **Do not operate diesel equipment where a flammable vapor environment can be created by fuel spill, leak, etc., unless equipped with an automatic safety device to block the air intake and stop the engine.**

HOT COOLANT CAN CAUSE SEVERE PERSONAL INJURY

- Hot coolant is under pressure. Do not loosen the coolant pressure cap while the engine is hot. Let the engine cool before opening the pressure cap.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not service control panel or engine with unit running. High voltages are present. Work that must be done while unit is running should be done only by qualified service personnel.
- Do not connect the generator set to the public utility or to any other electrical power system. Electrocution can occur at a remote site where line or equipment repairs are being made. An approved transfer switch must be used if more than one power source is connected.
- Disconnect starting battery (negative [–] cable first) before removing protective shields or touching electrical equipment. Use insulative mats placed on dry wood platforms. Do not wear jewelry, damp clothing or allow skin surface to be damp when handling electrical equipment.
- Use insulated tools. Do not tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches to avoid accidental closure.
- With transfer switches, keep cabinet closed and locked. Only authorized personnel should have cabinet or operational keys. Due to serious shock hazard from high voltages within cabinet, all service and adjustments must be performed by an electrician or authorized service representative.

If the cabinet must be opened for any reason:

1. Move genset operation switch or Stop/Auto/Handcrank switch (whichever applies) to Stop.
2. Disconnect genset batteries (negative [–] lead first).
3. Remove AC power to automatic transfer switch. If instructions require otherwise, use extreme caution due to shock hazard.

MEDIUM VOLTAGE GENERATOR SETS (601V TO 15kV)

- Medium voltage acts differently than low voltage. Special equipment and training are required to work on or around medium voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices. Improper use or procedures will result in severe personal injury or death.
- Do not work on energized equipment. Unauthorized personnel must not be permitted near energized equipment. Induced voltage remains even after equipment is disconnected from the power source. Plan maintenance with authorized personnel so equipment can be de-energized and safely grounded.

GENERAL SAFETY PRECAUTIONS

- Do not work on equipment when mentally or physically fatigued or after consuming alcohol or drugs.
- Carefully follow all applicable local, state and federal codes.
- Never step on equipment (as when entering or leaving the engine compartment). It can stress and break unit components, possibly resulting in dangerous operating conditions from leaking fuel, leaking exhaust fumes, etc.
- Keep equipment and area clean. Oil, grease, dirt, or stowed gear can cause fire or damage equipment by restricting airflow.
- Equipment owners and operators are solely responsible for operating equipment safely. Contact your authorized Onan/Cummins dealer or distributor for more information.

KEEP THIS DOCUMENT NEAR EQUIPMENT FOR EASY REFERENCE.

PERTINENT DATA

GENERAL

Low Oil Pressure Cut-off	14 psi.
High Water Temperature Cut-off	215°F.
Over-Speed Cut-off	2100 rpm

GENERATOR

Manufacture	ONAN
Model	60UL-299/18A
Rated KVA - 60 cps	75
50 cps	62.5
Rated Voltage	120/208 - 240/416
Phase	3
Rated Amp - 60 cps	208 (120/208V) 104 (240/416V)
50 cps	173 (120/208V) 86 (240/416V)
Cycles	50 or 60
RPM	1500 or 1800
Voltage Regulation	± 2%

Voltage adjustment with Voltage Regulator Rheostat (+10%, -5%).

Set ammeter selector switch in the same position on both plants. Adjust the voltage control on one plant to the point where the sum of the output ammeter readings of both plants is reduced to a value as low as possible. Several trial adjustments may be necessary.

EXAMPLE

Trial No.	Amps, Plant A		Amps, Plant B		Sum
1	60	–	65	–	125
2	65.4	–	55.6	–	121
*3	70.6	–	48.8	–	119.4
4	77.2	–	43.8	–	121

* Trial No. 3 indicates the correct voltage control adjustment since the sum of the two output ammeter (current) readings is the lowest obtained. The low sum indicates minimum cross currents between the two generators.

The output ammeters now indicate how the two plants are sharing the load. Plant B is not carrying its proper share of the load since it is supplying only 48.8 amperes as compared to 70.6 amperes supplied by plant A. Adjust the governor speed (frequency) control of plant B carefully to the point where the ammeter readings of both plants are equal.

The two plants should now be furnishing nearly equal power to the load, and reactive power should be equally divided. In some cases it may be desirable to repeat the voltage control adjusting step to reduce cross currents. If the output voltage or frequency is outside the desired limits, it may be necessary to make slight adjustments on plant A and then repeat plant B adjustments.

LOAD WIRE CONNECTION

The plant AC output terminals are located on the large terminal board outside the output box. Terminals L1, L2, L3, L4 (Neutral) are the load connection points.

Desired voltage (120/208-volt, 240/416-volt, with a frequency of 50 or 60-cps) is obtained by changing the jumper connections on the reconnection terminal block located in the output box. Remove all nuts from terminal board and move board which holds the jumper connections so the arrows line-up to the desired voltage. Tighten all nuts before operating.

IMPORTANT: When using three-phase circuits, balance the load between each circuit as much as possible by observing current flow on the AC Ammeter in the control panel.

To change output voltage, remove cover from output junction box to expose reconnection panel. Remove attaching hardware (12 nuts) and the outer reconnection jumper panel. Aline arrow pointers to indicate desired voltage (120/208 or 240/416). Install jumper panel and secure hardware..

NORMAL OPERATING FUNCTIONS

Safety Stopping Devices: In addition to the ac circuit breaker (which does not stop the plant), the plant is equipped with several safety devices that stop the engine under conditions that could cause severe damage.

NOTE: If one of the safety stopping devices operates to stop the plant the Emergency Latch Relay PUSH TO RESET button must be reset before the plant can be restarted.

1. Low oil pressure cut-off: A pressure operated switch mounted on the engine stops the plant if the engine oil pressure drops below about 14-lbs. The switch is not adjustable.

2. Over speed cut-off: A centrifugal weight type switch is attached to the outer end of the generator shaft. The switch operates to stop the plant if the engine speed should accidentally rise to a dangerous point. Under no circumstances should the plant be operated if the switch is disconnected or otherwise made inoperative. Excessive speed could cause extensive generator damage.

   WARNING: An overspeed protective switch is built into the outer end of the generator rotor shaft. This overspeed device automatically shuts off the engine if the speed reaches approximately 2100 rpm. Under no circumstances should the overspeed switch be by-passed or disconnected when the plant is operated. Extensive generator damage can result from overspeed operation.

   If the switch stops the plant, check the governor system to make sure it is adjusted correctly and operating freely. If the governor is correctly adjusted and engine is otherwise functioning properly, the plant still shuts down, the switch may not be operating properly.

3. High water temperature cut-off: A thermostatic switch is mounted on the engine. If the water temperature rises to about 215^{o}F., the switch acts to stop the plant. The coolant temperature must drop about 10^{o} before the engine can be restarted.

Oil Pressure: The oil pressure gage indicates the engine oil pressure while the engine is running. Normal oil pressure at operating temperature is within a range of 30 - 75 psi. Pressure will be high until the engine warms up.

Water Temperature: The panel water temperature gage indicates the coolant temperature during operation. Normal operating temperature is 165^{o}F. to 185^{o}F.

Charge Voltmeter: The dc voltmeter indicates the battery charge voltage. An automatic regulator controls the charge rate, which varies according to the charge condition of the battery. The charge rate will be comparatively high when the plant first starts, but should fall to almost zero as the battery becomes fully charged.

GENERATOR: The generator is a synchronous four-pole, revolving field, externally-excited (generator mounted static exciter) type. The revolving field is coupled to the engine and rotates at engine speed. Field excitation voltage (DC) is supplied and regulated by the static exciter through slip rings and brushes to the field coils (Fig. 4-1). The alternating current output is tapped from the stator windings with the output leads terminated at the large terminal board on the output box. By changing the jumper connections, either 120/208, or 240/416 volts may be obtained.

The static exciter (Magneciter) functions as both a voltage regulator and a power supply for the revolving field. By regulating the amount of current to the field, it controls the ac output voltage of the generator. The circuit shown in Fig. 4-2 is the power supply. It's a full wave rectifier and supplies direct current to the field. Two saturable reactors control the generator output voltage by controlling the current flowing in the field (Fig. 4-3).

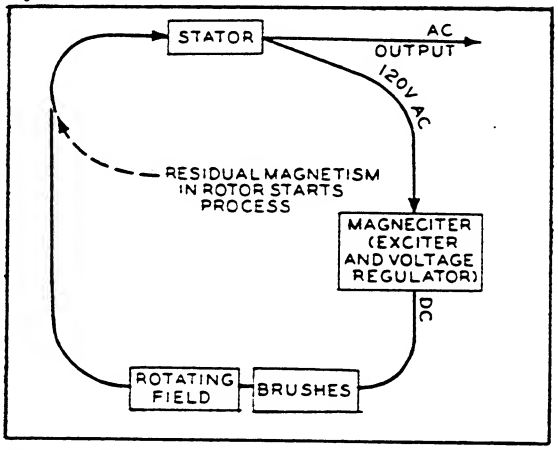


FIG. 4-1. SCHEMATIC ALTERNATOR AND EXCITER

Each saturable reactor is a doughnut shaped metal core with 3 windings, an output or gate winding and two control windings. The amount of current the reactor allows to flow in the gate winding is dependent on the degree of saturation of the reactor core. As core saturation increases, the gate opens, until finally, when the core is fully saturated, the gate is all the way open and the reactor does not oppose current flow. Since the rectifiers allow current in the gate winding to flow in only one direction, it can act only to saturate the core. If the saturation of the core were decreased, this would reduce the current flow through the gate winding.

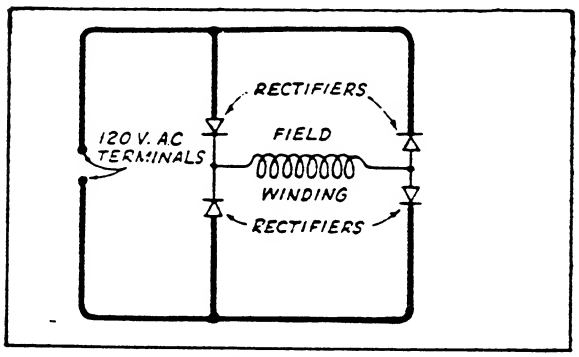


FIG. 4-2. POWER SUPPLY

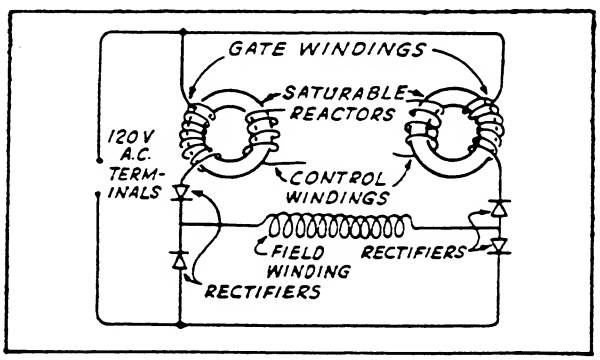


FIG. 4-3. POWER SUPPLY WITH GATE REACTORS

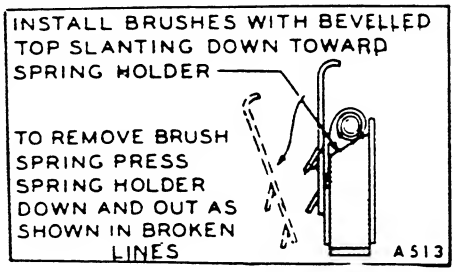
CONTROL: The control section is mounted at the rear of the unit and is accessible through the rear door. The control panel swings down for access to the rear of the panel and internal wiring. The control panel contains all connections, meters, and controls to monitor and adjust generator output. A amp load circuit breaker is wired in series with the output terminals of the load-connection terminal board. The load breaker will open in case of an overload in the load circuit and protects the generator output windings. A 18-amp field circuit breaker is connected in series with the static exciter input. The breaker will open in case of a generator overload and protect the static exciter from damage. A voltage regulator rheostat in the voltage regulator portion of the exciter allows a change in voltage output. Turn clockwise to increase voltage or counterclockwise to decrease voltage. The AC ammeter and three current transformers monitor current output for each generator output phase.

The engine control panel contains signal light, latching relay, gages, and switches to monitor and control engine operation. The oil pressure gage and water temperature gage are wired into resistance element type sending units mounted on the engine. The charge voltmeter indicates battery voltage of the engine electrical system. It is wired in parallel with the battery. The RUN-STOP-REMOTE switch controls plant starting and stopping from the engine control panel. When set at RUN, battery voltage is applied to the normally closed contacts of the cranking limiter, latching relay, starter pilot relay, starter solenoid (the starter engages and begins to crank the engine). As the engine starts to crank, a heating element in the Cranking Limiter is energized and continues to heat until cranking stops or its thermal device operates to de-energize (open) the limiter. The limiter allows approximately one minute of engine cranking before opening. A button protrudes from the limiter when open. Limiter contacts open to remove battery voltage from the ignition system and open the circuit to the Starter Solenoid to stop engine cranking. The limiter must be manually re-set before engine cranking can again be attempted. As the engine starts and builds up speed the battery-charging generator begins to produce voltage. A connection to the armature or generator terminal on the regulator to the coil of the Start-Disconnect relay allows generator voltage to energize the Start-Disconnect relay and open the circuit to the starter solenoid to stop engine cranking. The Time Delay relay in the low oil pressure circuit energizes, contacts open, for approximately 15-seconds to allow oil pressure build-up while starting. After the 15-second delay, the contacts close to complete the low-oil pressure circuit to the pressure switch. If the oil pressure drops below 14-psi, the pressure switch actuates allowing the Latching Relay to open, stopping the plant. The latching relay must be manually re-set before resuming operation. The low oil pressure condition must be repaired before the plant will operate. The High Water Temperature switch actuates when the coolant temperature exceeds 215^{o}F. The latching relay energizes, shutting down the plant. The latching relay must be manually re-set before resuming operation and the high temperature condition must be repaired before the plant will operate. The over-speed switch is a centrifugal type mounted on the end of the generator shaft behind the static exciter. If plant speed exceeds approximately 2100 rpm, the switch actuates, energizing the latching relay and shutting down the plant.

GENERATOR MAINTENANCE

Generators normally require little servicing. Periodic inspection, to coincide with engine oil changes, will assure continued good performance.

Brushes: To examine the brushes, brush springs, and slip rings, remove the inspection and ventilating covers from the end bell openings. Keep the end bell, brush rig, etc., free of dust and dirt.



BRUSH HOLDER

Brushes should be replaced when worn to approximately 1/2-in., or so that the lead end of the brush is below a point midway between the outer and inner end of its guide. Do not attempt to remove the brush without first removing its spring and bracket. Never bend a spring back over its bracket - doing so will put a kink in it and require its replacement. Do not use a substitute brush that may look identical but may have entirely different electrical characteristics. Be sure the brush is installed so that the short side of its taper is toward the spring and its bracket.

Generator Bearing: The generator bearing is prelubricated for its life and sealed. It requires no servicing.

Exciter: The exciter contains no moving parts. Occasionally blow out any dust, etc. Check thoroughly to assure that all components are mechanically secure, and that all electrical connections are tight.

b. Using an accurate ohmmeter, test the resistance of each stator winding. Compare the resistances obtained. All windings of equal output voltage should indicate about the same resistance. An usually low reading indicates a short; a high reading an open circuit.

If the ohmmeter required for this test isn't available, check for open circuits with the test lamp.

If any windings are shorted, open-circuited or grounded, replace the stator assembly. Before replacement, check the leads for broken wires or insulation and replace any defective lead. If this does not correct the fault, replace the assembly.

3. No terminal of the exciter should show a grounded circuit.

4. Checking static exciter - Troubles are listed in advancing order, from no output voltage to a rated but fluctuating output voltage. The relationship between trouble and cause is not always consistent from model to model, so the following information must be used as a guide, not an absolute rule. The column entitled "step" indicates the step for testing a standard component. When the word "None" appears in that column, all the information needed to complete the check is given in the column headed "Corrective Action". Use a multimeter to check continuity, voltage, and resistance as indicated in the tests.

Note: It is imperative that the testing procedures are completely understood by the serviceman before attempting to perform corrective maintenance. Use caution when working on an operating plant.

NATURE OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION	STEP
Output voltage slow to build up. Circuit breaker opens in about five seconds	Either Field Rectifier CR2 or CR3 shorted.	Test rectifiers and replace if defective	5
Output voltage slow to build up and five per cent below rated voltage after build up. Voltage regulation poor.	Either Field Rectifier CR1 or CR4 shorted.	Test Rectifier and replace if defective	5
Output voltage slow to build up and higher than rated voltage after build up	Open circuit in one or more Control Rectifier	Test rectifier and replace if defective. Check soldered connections to rectifiers	5
Output voltage slow to build up and ten to twenty percent above rated voltage after build up	Open in one Field Rectifier	Test rectifiers and replace if defective	5
	Open circuit in Gate winding G1-G2 of Reactor L1 or L2.	If Field Rectifiers CR1 & CR2 check okay, check continuities of Gate windings G1-G2	6
Output voltage builds up normally but less than rated voltage after build up	Shorted winding in Control Reactor	Test Control Reactor and replace if defective	7
Output voltage builds up normally with slightly less than rated voltage at no load and low voltage at full load	Compound winding S1-S2 installed backward or has open circuit.	Check wiring diagram for polarity of Compound windings through Reactors L1 and L2, test for continuity	None
Output voltage builds up normally but 20 percent above rated voltage after build up. Voltage regulation poor.	Compound winding S1-S2 installed backward through one Reactor (L1 or L2).	Check wiring diagram for polarity of Compound winding through Reactor L1 and L2.	None
Output voltage builds up normally but is twenty five percent above rated voltage after build up	Open circuit in Control Rectifier bridge	Check continuity from the junction of Control Rectifiers CR1 and CR2 the junction of Control Rectifiers CR3 and CR4.	None

6. Checking reactors L1 and L2:

   a. Set the resistance range selector on the meter to the resistance range.

   b. Isolate one Gate winding by disconnecting either end of Gate winding G1-G2 from its point of connection; for example, disconnect G1 at E2. Measure the resistance in the Gate winding across G1-G2. Should be 0.337.

   c. Isolate one Control winding by disconnecting either lead C1 or C2 from the terminal block. Measure the resistance in the Control winding across C1-C2. Should be 1.58. S1 - S2 = 2.00.

   d. Connect one meter lead to the disconnected Gate winding lead and the other meter lead to the disconnected Control winding lead and check for continuity.

   Results:

      1. REACTOR IS SERVICEABLE if resistance is within 20 percent either way of the value listed and there is no continuity between the Control and Gate windings.

      2. REACTOR IS DEFECTIVE if there is an open circuit in either the Gate or the Control windings. Continuity between the Gate and the Control windings is also an indication of a defective Reactor. In either case, the Reactor should be replaced.

7. Checking Control Reactor.

   a. Isolate the Control Reactor by disconnecting common lead "C" from its point of connection and carefully measure the resistance from this lead to the numbered lead on the Control Reactor. Should be 18.0.

   Results:

      1. CONTROL REACTOR IS SERVICEABLE if resistance is within 10 percent of the value specified.

      2. CONTROL REACTOR IS DEFECTIVE if no continuity is indicated between the common lead "C" and the numbered lead, indicating the presence of an open circuit.

8. Checking Resistors:

   The resistors must be checked with a multimeter adjusted to the appropriate range of resistances. See wiring diagram for correct values.

   a. Isolate the Resistor by disconnecting one end from its point of connection and carefully measure the resistance.

Generator Disassembly: If generator tests determine generator repair is required, remove and disassemble the generator according to Generator Assembly Figure and the following instructions.

1. Disconnect generator and control leadwires from the terminal blocks in the control box. Check leadwire markings for legibility to ease assembly. Arrange leads so they can be withdrawn from the control box easily.

2. Remove the cap nuts (4) which attach the exciter cover and remove the cover. Disconnect the leadwires which come from the generator to the exciter (check leadwire markings for legibility). Remove the capscrews (6) which secure the exciter to the generator end bell and remove the entire exciter assembly.

3. Remove the centrifugal switch (item 8) from the end bell (13) and rotor shaft. Remove the end bell covers (items 9, 9A). Slip the brushes (item 7) and springs (item 6) from brush rig (item 5) - it is not necessary to disconnect the brush leads unless brush replacement is required.

4. Block the rear of the engine in place by supporting the flywheel housing. Remove the narrow generator band (item 14). Remove the large capscrews which secure the generator mounting pad (item 19) to the skid base. Remove the capscrews which secure the stator assembly (item 4) to the engine flywheel housing.

5. Using an overhead hoist and sling, slide the stator assembly (item 4) off the rotor assembly (item 1). CAUTION: Do not damage the brush rig (item 5) while removing the stator.

6. Remove the brush rig (item 5), large generator band (item 15), and the end bell (item 13) from the stator assembly (item 4) if required.

7. Attach the hoist and sling to the rotor assembly (item 1) and apply a slight lift to support the rotor. Remove the bolts which secure the flexible drive coupling to the engine flywheel and pull the rotor from the engine.

8. Pull the bearing (item 3) from the rotor shaft if required with a wheel or gear puller. If required, remove the blower (item 2) from the rotor and the air scroll (item 11). Refer to the Parts Catalog for replaceable parts and assemblies.

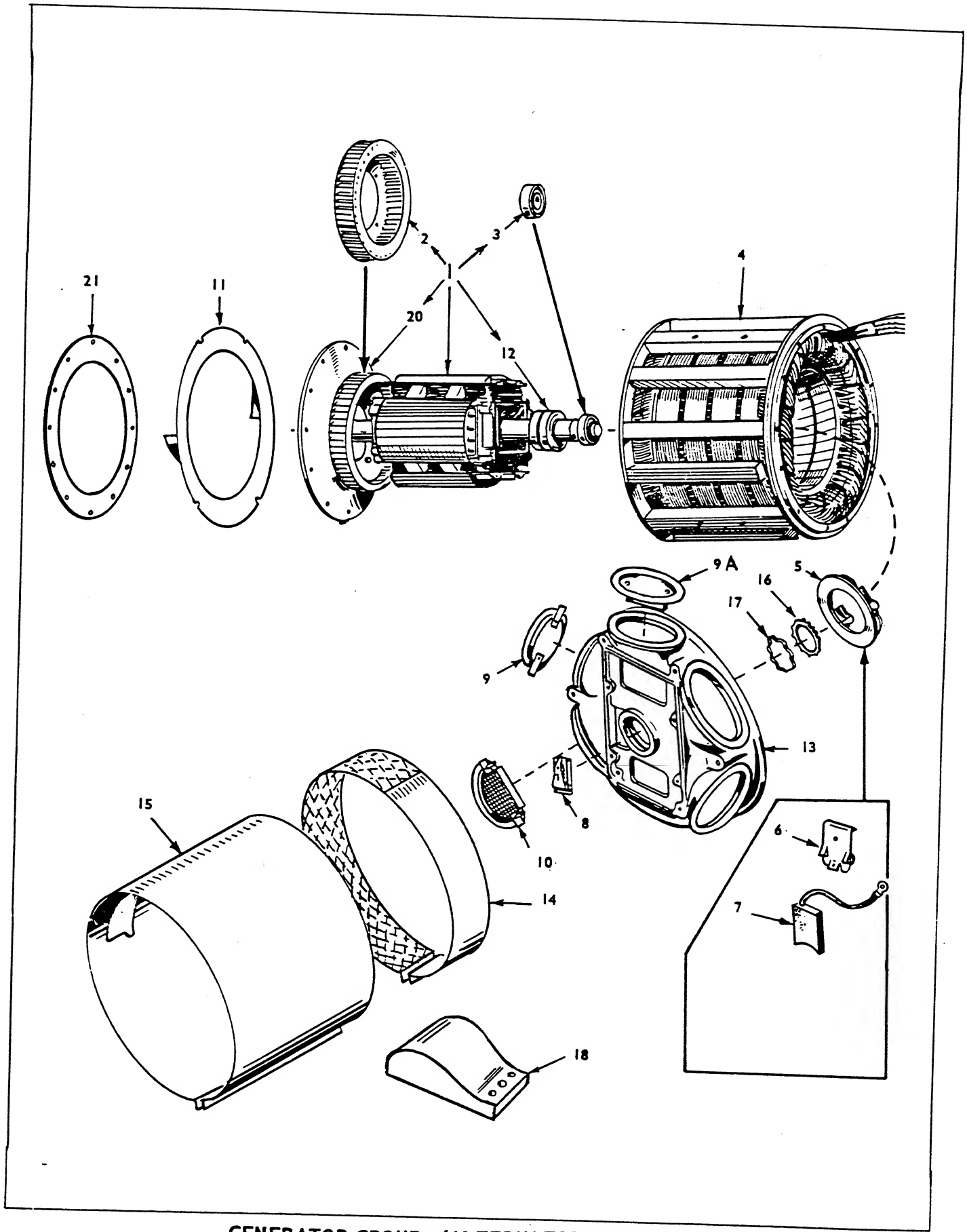
Generator assembly is the reverse of disassembly procedures.

Static exciter service and repair does not complete disassembly. Individual components are easily accessible for servicing. All components are easily removable after disconnecting the attached leadwires. Refer to the Parts List for the exploded view and part numbers . See its Wiring Diagrams for leadwire connections.

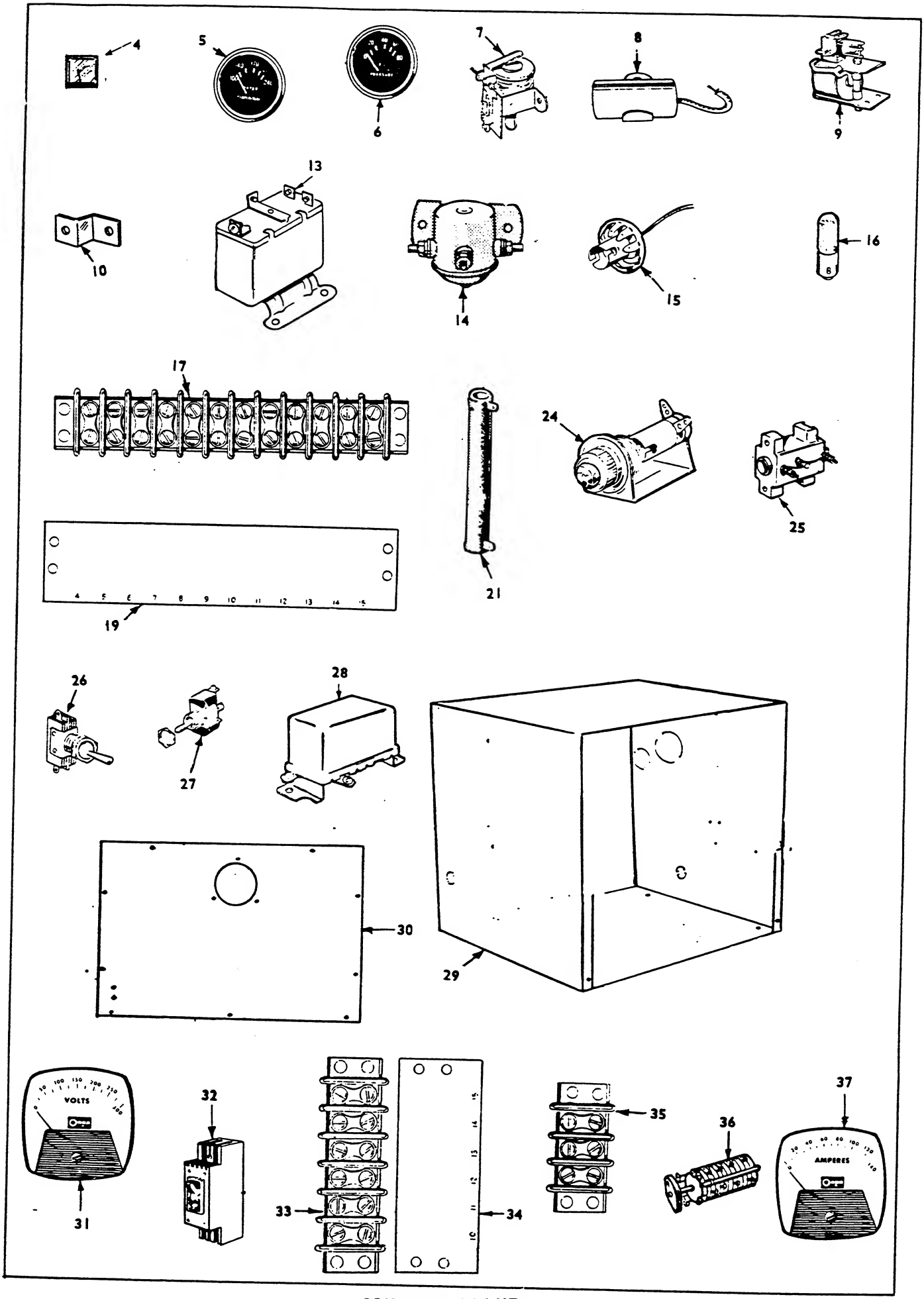
TROUBLE-SHOOTING CHART

POSSIBLE CAUSE	REMEDY
ENGINE RUNS BUT VOLTAGE DOES NOT BUILD UP	
Poor brush contact.	See that brushes seat well on slip rings, are free in holders, are not worn too short, and have good spring tension. Refer to the *Generator Maintenance and Repair* section.
Open circuit, short circuit, or ground in generator	
VOLTAGE UNSTEADY BUT ENGINE NOT MISFIRING	
Speed too low.	Adjust governor to correct speed.
Poor brush contact.	Refinish slip rings if necessary. See that brushes seat well on slip rings, are free in holders, are not worn too short, and have good spring tension.
Loose connections.	Tighten connections.
Fluctuating load.	Correct any abnormal load condition causing trouble.
GENERATOR OVERHEATING	
Short in load circuit.	Correct short circuit.
Generator overloaded.	Reduce the load.

POSSIBLE CAUSE	REMEDY
VOLTAGE LOW AT FAR END OF LINE BUT NORMAL NEAR PLANT	
Too small line wire used for load and distance.	Install larger or extra wires or reduce load.
MOTORS RUN TOO SLOWLY AND OVERHEAT AT FAR END OF LINE BUT OK NEAR THE PLANT	
Too small line wire used for load and distance.	Install larger or extra wires or reduce load.
NOISY BRUSHES	
Rough slip rings.	Resurface. Undercut mica.
EXCESSIVE ARCING OF BRUSHES	
Rough slip rings.	Turn down.
Dirty slip rings.	Clean.
Brushes not seating properly.	Sand to a good seat or reduce load until worn in.



GENERATOR GROUP - (ALTERNATOR PORTION)

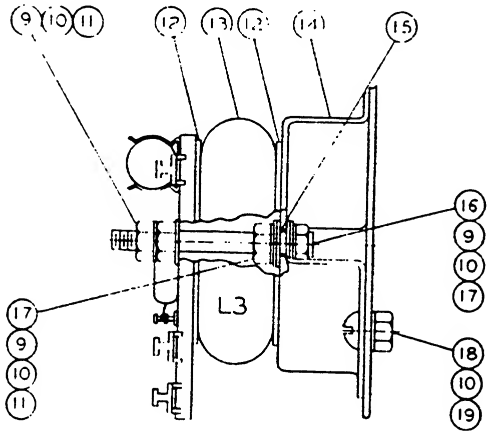


CONTROL GROUP

REF. NO.	PART NO.	QUANT. USED	DESCRIPTION
			GENERATOR GROUP (Alternator Portion)
	208A49	1	Generator, Complete - Replacement
1	201A1433	1	Rotor Assembly, Wound - Includes Bearing, Blower and Drive Assembly
2	205C49	1	Blower
3	510P63	1	Bearing
4	220-997	1	Stator Assembly, Wound
5	212C248	1	Rig Assembly, Brush - Includes Brushes & Springs
6	212B1105	4	Spring, Brush
7	214A46	4	Brush
8	150A717	1	Switch Assembly, Overspeed
			Cover, End Bell Opening - Includes Latch & Bracket.
9	232B1254	3	Plain
10	232B1253	2	Screened
11	234C84	1	Scroll, Air
12	204P83	1	Ring, Collector
13	211A161	1	Bell, End - Alternator to Exciter
14	234C83	1	Band, Generator - Front Portion - Narrow
15	234B263	1	Band, Generator - Rear Portion - Wide
16	232A1186	1	Holder, Bearing - Anti-Rotation
17	232A1187	1	Spring, Bearing Holder - Anti-Rotation
18	232C1556	2	Pad, Generator Mounting
20	232B1434	1	Disc-Rotor Drive
21	232B1248	As Req.	Shim, Drive Disc (Exciter Portion)
			GENERATOR GROUP (Exciter Portion)
	209D70	1	Exciter Assy., Complete (103SX/52)- Less Cover
1	234D106	1	Cover, Exciter
2	520A575	3	Stud, Exciter Cover Mounting
2A	866-1	3	Nut, Acorn - Exciter Cover Mounting
3	234D105	1	Panel Only, Exciter
4	305B427	1	Rectifier Assembly, Power (Complete) Includes four #358C11 plus wire and hardware
5	358C11	4	Rectifier Only, Power (Field) included with #305B427 Assembly
6	150B733	1	Bracket Only, Overspeed Switch
7	150A772	1	Stud and Contact Point Assembly, Voltage Control Reactor Mounting
8			Washer, Fibre Insulating - Voltage Control Reactor Stud Mounting
	508-18	2	1/4" x 3/4" x 1/16"
	508-29	1	1/4" x 3/8" x 1/32"
9	315A262	1	Reactor, Voltage Control - Does not include terminal block
12	234B60	2	Bracket, Reactor Mounting
13	304A527	1	Resistor, Control - (500 ohm, 50 watt) - 3/4 x 4" tapped
14	520A579	2	Stud, Resistor Mounting
16	304A15	4	Washer, Centering - Resistor Mounting
17	305P240	4	Rectifier
18	315A261	2	Reactor, Gate
19	234B62	2	Retainer, Gate Reactor
20	232A1361	2	Stud, Gate Reactor Mounting
21	304A21	1	Resistor, Fixed - Alternator Field (Damping) 3/4" x 4" (200 ohm, 50 watt).

REF. NO.	PART NO.	QUANT. USED	DESCRIPTION
			CONTROL GROUP (Cont.)
43	303P66	1	Rheostat, Voltage Regulator
44	303-32	1	Knob, Rheostat - Begin Spec "B"
45	304A1	1	Resistor, 3-Ohm, 75-Watt
46	301A2395	1	Bracket, Panel Stop (LH)
47	301A2753	1	Bracket, Panel Stop (RH)
48	508P116	1	Grommet, Output Box
49	322-95	2	Receptacle, Synchronizing Lamp
50	322-60	2	Lamp, 10-Watt, 230-Volt
51	308-5	1	Switch, Cycles
52	308-23	1	Switch, Synchronizing
53	308P69	1	Switch, Cross Current
54	307B282	1	Relay
55	304A516	2	Resistor, Synchronizing Light
56	302-610	1	Meter Frequency
57	332C965	1	Panel Assy., Reconnection
58	332A960	12	Stud, Term. Reconnection Panel
59	332B969	1	Panel Assy., Output Connection Post
60	332-959	4	Connector, Terminal post
61	332A968	4	Spacer Terminal Mounting
62	193A98	1	Sender, Oil Pressure Gauge - Engine Sending Unit Only
63	193A100	1	Sender, Water Temp. Gauge - Engine Sending Unit Only
64	309A169	1	Switch, Low Oil Pressure
65	309A179	1	Switch, Water Temp.

LTR	REVISION	ZONE	ENG.	CKR.	DATE
A	PART NO. WAS 336A123	6-C			8-3-66
	G.F.N. REVISIONS FOR TERM. IDENT.				8-3-66
B	REMOVED ITEM 6, 332A975	6-A			8-9-66
C	REMOVED ITEM 36, 332A982	6-C			8-9-66
D	SILKSCREEN CHANGED	4-D			8-9-66



VIEW "A-A"

	38	TB1-6	TB1-4	SEE NOTE 3
L3	SELF LEAD	L3-C	TB1-12	
L3		L3-42	TB1-8	
L3		L3-41	TB1-9	
CR8		TB1-5	TB1-12	
CR6		TB1-3	TB1-5	
CR5		TB1-11	TB1-3	
CR7		TB1-12	TB1-11	
R4		TB1-11	TB1-2	
R3		TB1-10	TB1-7	
C	SELF LEAD	TB1-10	TB1-1	SEE NOTE 3
R6	56	TB2-3	A-6	[illegible]
	47	R2-2	A-6	
R5	48	TB2-3	A-5	
	59	TB2-2	A-1	
	52	A-2	R2-1	
	55	TB2-1	TB2-4	
	54	TB2-1	R1-3	
	61	TB1-3	R1-2	
	51	TB2-5	A-3	
	[illegible]	TB3-44	R1-1	
	[illegible]	TB3-43	TB2-5	
	[illegible]	TB3-42	TB1-8	
	53	TB3-41	TB1-9	
	SELF LEAD	L2-S2	A-6	
		L2-S1	TB1-1	
		L2-G2	A-4	
		L2-G1	TB2-1	
		L2-C2	TB1-4	
		L2-C1	TB1-2	
		L1-S2	TB2-2	
		L1-S1	TB1-7	
		L1-G2	A-5	
		L1-G1	TB2-1	
		L1-C2	TB1-6	
	SELF LEAD	L1-C1	TB1-5	
COMPONENT REFERENCE DESIGNATION	LEAD ITEM NO.	COMPONENT & TERMINAL NO. STATION FROM	COMPONENT & TERMINAL NO. STATION TO	REMARKS

WIRING TABULATION

	62	898P805	2 3/8"	INSULATION, SLEEVING
	61	336A1648	1	LEAD ASSY
	60	336A1646	1	LEAD ASSY
	59	336A1647	1	LEAD ASSY
	58	517-21	1	DOT BUTTON
	57	880-12	AR	SOLDER
R6	56	336A1641	1	LEAD ASSY (RES. 0.010 OHM)
	55	336A1301	1	LEAD ASSY
	54	336A1256	1	
	53	336A1253	1	
	52	336A1225	1	
	51	336A1047	1	
	50	336A337	1	
	49	336A279	1	LEAD ASSY
Ⓐ R5	48	336A1650	1	LEAD ASSY (RES. 0.0024 OHM)
	47	336A902	1	LEAD ASSY
CR5,6,7,8	46	305P240	4	RECTIFIER, SILICON
C	45	356P22	1	CAPACITOR 50UF, 100VDC
R4	44	350-1130	1	RESISTOR, FIXED, 2W, 330 OHM
R3	43	350-1144	1	RESISTOR, FIXED, 2W, 4700 OHM
R2	42	304A21	1	RESISTOR, FIXED
	41	332P942	7	CABLE TIE
	40	332P941	2	CABLE TIE
TB1	39	332B979	1	TERMINAL BOARD ASSY
	38	331P738	3"	WIRE, ELEC. TIN COATED, NO. 18 AWG
TB2	37	332A604	1	TERMINAL BLOCK
Ⓒ	36			
	35	815-1	5	6-32 X 1/4 LG BRASS BINDER HD SC
	34	871-6	9	6-32 BRASS HEX NUT
	33	854-6	9	#6 I T WASHER
	32	526-104	4	#6 FLATWASHER
	31	520A579	2	6-32 STUD
	30	232A1474	4	SPACER - RESISTOR
	29	304A15	4	WASHER - CENTERING
R1	28	304A527	1	RESISTOR
L1, L2	27	315C261	2	REACTOR - SATURABLE
	26	870-65	2	1/4-20 HUGLOCK NUT
	25	526-15	2	1/4 FLATWASHER
	24	232A1361	2	1/4-20 STUD
	23	234B62	2	RETAINER - COIL
	22	232A1546	2	GASKET - COIL RETAINER
	21	232A1547	2	GASKET - COIL RETAINER
	20	234B60	2	BRACKET - REACTOR
	19	862-1	2	1/4-20 HEX NUT
	18	812-146	2	1/4-20 X 3/8 LG RHSMS
	17	508-18	2	INSULATING WASHER
	16	150A772	1	STUD & CONTACT ASSY
	15	508-29	1	INSULATING WASHER
	14	150A733	1	BRACKET - OVERSPEED SWITCH
L3	13	315B262	1	REACTOR - CONTROL
	12	232A1548	2	GASKET - COIL RETAINER
	11	871-15	3	1/4-20 BRASS HEX NUT
	10	854-14	5	1/4 I T WASHER
	9	526-52	3	1/4 BRASS FLATWASHER
A	8	305B427	1	RECTIFIER ASSY
	7	812-77	2	8-32 X 3/8 LG RHSMS
Ⓑ	6			
TB3	5	332A537	1	TERMINAL STRIP
	4	860-8	6	8-32 HEX NUT
	3	854-7	6	#8 I T WASHER
	2	812-81	4	8-32 X 5/8 LG RHSMS
	1	234D105	1	PANEL - EXCITER
REF DES	ITEM	PART NO	QTY	DESCRIPTION

LIST OF MATERIAL

TOLERANCES UNLESS OTHERWISE SPECIFIED: FRACTIONS / DECIMALS / ANGLES

Onan — DIVISION OF STUDEBAKER CORPORATION, MINNEAPOLIS, MINNESOTA

DATE 7-11-66 | DR HCP | CHK R.P. | SC 1/1

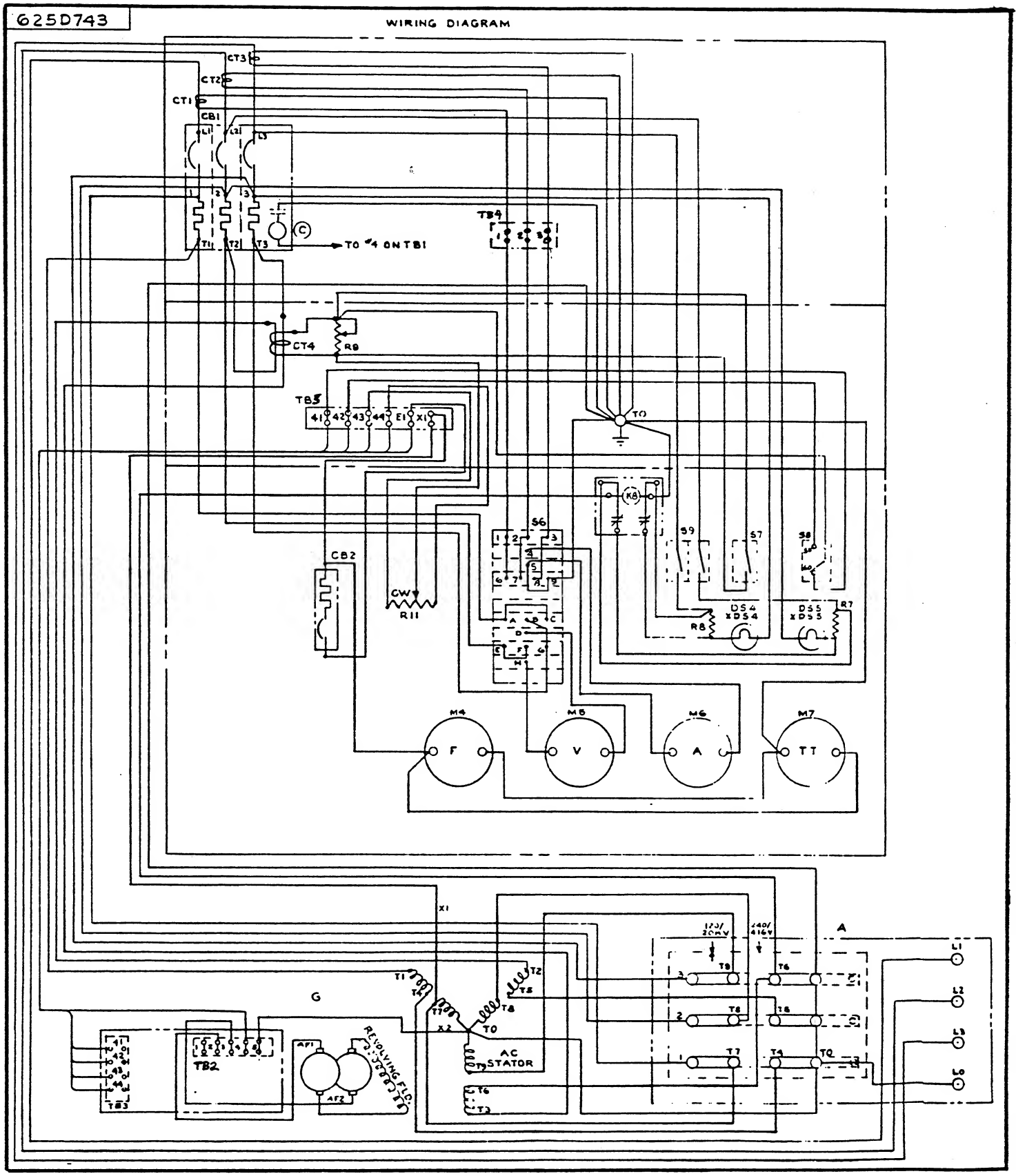
NAME: STATIC EXCITER ASSY (WIRED)

MODEL: 1035X/52

DWG NO. 209D70

209D70

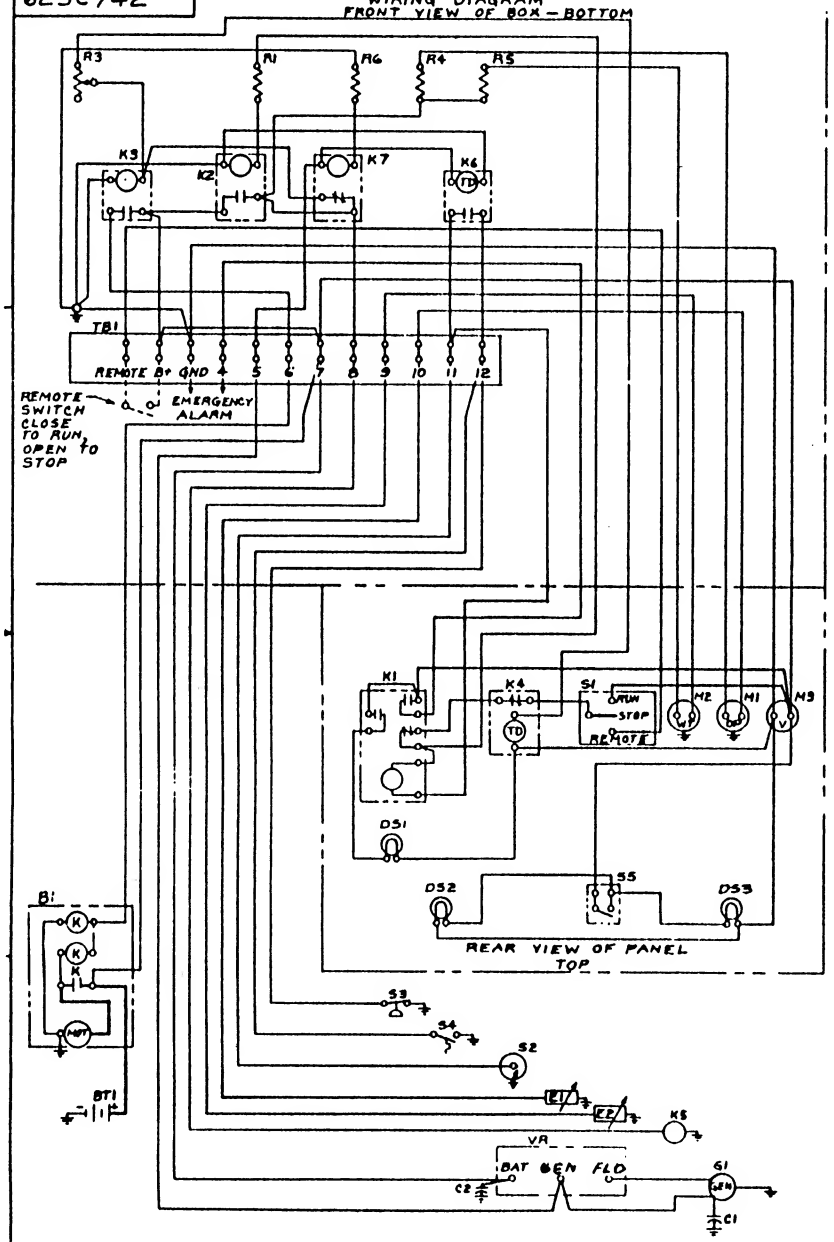
PRINT 209D70 Sheet 2 of 2



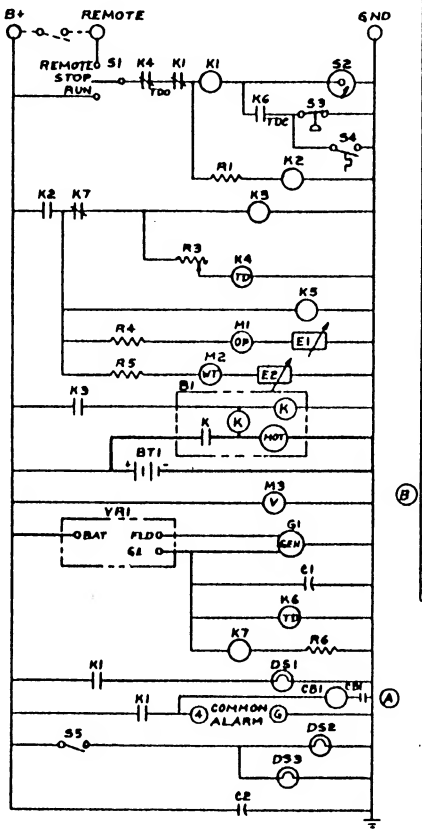
PRINT 625D743 Sheet 1 of 2

625C742

WIRING DIAGRAM
FRONT VIEW OF BOX – BOTTOM



SCHEMATIC



NOTE:
R2 NOT USED

NOTE:
USE WITH WIRING DIAGRAM 625D743

PARTS LIST

REF DEF	PART NO.	QTY	DESCRIPTION
B1	———	1	STARTING MOTOR & SOLENOID
BT1	———	1	BATTERY - 24 VDC
C1,C2	312A58	2	CAPACITOR - .1 MFD
DS1	322-17	1	LAMP - ALARM
	322P69	1	LAMP HOLDER
DS2,DS3	322-17	2	LAMP - PANEL
	322P5	2	LAMP HOLDER
E1	193A98	1	OIL PRESSURE GAUGE ELEMENT
E2	193A100	1	WATER TEMP GAUGE ELEMENT
G1	———	1	GENERATOR - CHARGE
K1	307A635	1	RELAY - EMERGENCY LATCH
K2	307B537	1	RELAY - FUEL SOLENOID
K3	307B61	1	RELAY - STARTER PILOT
K4	320B104	1	RELAY - CRANKING LIMITER
K5	———	1	SOLENOID - FUEL
K6	307B899	1	RELAY - TIME DELAY (15 SEC)
K7	307B52	1	RELAY - START DISCONNECT
M1	193B111	1	GAUGE - OIL PRESSURE
M2	193B112	1	GAUGE - WATER TEMP.
M3	302P611	1	VOLTMETER 16 - 32 VDC
R1	304A276	1	RESISTOR 75-OHM, 10W
R3	353A17	1	RESISTOR 7.5-OHM, 50W
R4,R5	304A446	2	RESISTOR 150-OHM, 0W
R6	304A262	1	RESISTOR 50-OHM, 10W
S1	308P138	1	SWITCH-SELECTOR
S2	150A717	1	SWITCH-OVERSPEED
S3	309A169	1	SWITCH-LOW OIL PRESSURE
S4	309A179	1	SWITCH-HIGH WATER TEMP
S5	308-2	1	SWITCH-LAMP
TB1	332A607	1	TERMINAL BLOCK
	332A277	1	MARKER STRIP
VR1	———	1	CHARGE REGULATOR

625C742

REV	DESCRIPTION	BY	DATE
B	MARKER STRIP WAS 332A46	DT	6-23-66
A	ADDED SHUNT TRIP "CB1"	DT	6-21-66

Onan DIVISION OF STUDEBAKER CORPORATION

DATE	BY	TRACED
5-27-66	W J B	G.F.T.

WIRING & SCHEMATIC DIAGRAM
ENGINE CONTROL, 24 VOLT DIESEL

MODEL NO 300-430

DWG NO 625C742